

# Recent eastern Pacific species of *Sanguinolaria* and *Psammotella* (Bivalvia: Psammobiidae)

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## ABSTRACT

There are three Recent eastern Pacific species of *Sanguinolaria*, *S. ovalis* Reeve, 1857, *S. tellinoides* A. Adams, 1850, and *S. tenuis* Olsson, 1961, and one species of *Psammotella*, *P. bertini* (Pilsbry and Lowe, 1932). A neotype for *P. bertini* and lectotypes for *S. tellinoides* and its junior synonym *S. purpurea* are designated herein. The distributions of the species are documented, along with their fossil occurrences and their relationships to other Recent and to fossil species.

## INTRODUCTION

Having discussed the eastern Pacific representatives of the genera *Heterodonax* (Coan, 1973: 46–46) and *Gari* (Coan, 2000), I herein complete the review of the family Psammobiidae with treatment of four species that have previously been assigned to the genus *Sanguinolaria*.

Previous reviews of *Sanguinolaria* are those of Reeve (1857) and Bertin (1880). Tryon (1869) listed the then-known species. Dall (1898, 1900: 978–979) and Willan (1993) discussed the genera of the Psammobiidae.

Thus far, there are no papers on the anatomy or biology of *Sanguinolaria* or *Psammotella*.

## MATERIALS AND METHODS

In the following treatment, each valid taxon is followed by a synonymy, information on type specimens and type localities, notes on distribution and habitat, and an additional discussion.

The synonymies include all major accounts about the species, but not most minor mentions in the literature. The entries are arranged in chronological order under each species name, with changes in generic allocation from the previous entry, if any, and other notes given in brackets.

The distributional information is based on Recent specimens I have examined, except as noted. Habitat information is scant, because most material has been collected in beachdrift. Fossil occurrences are taken from the literature.

References are provided in the Literature Cited for all works and taxa mentioned.

**Morphological Characters:** A combination of shell shape and color, and various aspects of the shape of the pallial sinus suffice to distinguish among the four species discussed here; these are detailed in the descriptions and in Table 1.

**Abbreviations:** The following abbreviations are used in the text: ANSP, Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvania, USA; BMNH, British Museum (Natural History) collection, The Natural History Museum, London, England; CAS, California Academy of Sciences, San Francisco, California, USA; ICZN, International Commission on Zoological Nomenclature; LACM, Natural History Museum of Los Angeles County, California, USA; PRI, Paleontological Research Institution, Ithaca, New York, USA; MCZ, Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA; MNHN, Muséum national d'Histoire naturelle, Paris, France; SBMNH, Santa Barbara Museum of Natural History, Santa Barbara, California, USA; SDMNH, San Diego Museum of Natural History, San Diego, California, USA; UMMIL, University of Miami Marine Laboratory, Rosenstiel School of Marine and Atmospheric Science, Miami, Florida, USA; USNM, United States National Museum collection, National Museum of Natural History, Smithsonian Institution, Washington, DC, USA; ZMC, Zoologisk Museum Copenhagen, Denmark.

Material in the private collections of Carol C. Skoglund, Phoenix, Arizona, USA; and Kirstie L. Kaiser, Puerto Vallarta, Jalisco, Mexico, was also examined.

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Table 1. Key differentiating characters, size, and frequency of Eastern Pacific *Sanguinolaria* and *Psammotella*

	Color	Shape	Pallial sinus	Maximum size, mm	No. lots studied
<i>S. ovalis</i>	white, with pink beaks	equivalve, ovate, equilateral	greatly expanded, pointed dorsally; meets pallial line at approx. 50° angle	34	20
<i>S. tellinoides</i>	purplish red	equivalve, ovate-elongate, longer posteriorly	expanded dorsally; meets pallial line at 90° angle	72	79
<i>S. tenuis</i>	white	equivalve, ovate-elongate, longer anteriorly	greatly expanded, pointed dorsally; meets pallial line at approx. 75° angle	34	1
<i>P. bertini</i>	purplish red	right valve more inflated, elongate, longer posteriorly	elevated, rounded dorsally; meets pallial line at approx. 30° angle	93	95
			Total lots studied.		195

## SYSTEMATICS

Family Psammobiidae Fleming, 1828

Genus *Sanguinolaria* Lamarek, 1799*Sanguinolaria* Lamarek, 1799, 84.Type species (by monotypy): *Solen sanguinolentus* Gmelin, 1791: 3227.

**Description:** Equivalve, with a narrow posterior gape. Periostracum thin. Pallial sinus deep, moderately to very elevated dorsally; its dorsal line with an expanded muscle attachment area just anterior to posterior adductor. Posterior cruciform muscle scar without a small anterior satellite scar. Hinge narrow to moderate in width; teeth small; nymph weak.

*Sanguinolaria ovalis* Reeve, 1857

Figures 1, 2, 9

*Sanguinolaria ovalis* Reeve, 1857: pl. 1, fig. 2; Mörch, 1860: 155; Carpenter, 1864: 563 [1872 reprint: 49] [as a possible synonym of *S. miniata*]; Tryon, 1869: 75; Bertin, 1880: 84; Dall, 1895: 61 [as a synonym of *S. tellinoides*]; Keen, 1955: 155, 159, fig. 460 [as a separate species]; Keen, 1971: 243, fig. 610, 244 [not to be confused with *Hiatula ovalis* Bertin, 1880: 92, pl. 1, fig. 5a, b, a species of *Soletellina* described from an unknown locality].

*Sanguinolaria vespertina* Pilsbry and Lowe, 1932: 90, 91, 111 [as "*Solen*" *vespertina*]; pl. 12, figs. 3, 4; Hertlein and Strong, 1950: 220; Keen, 1955: 155 [as a synonym of *S. ovalis*]; Olsson, 1961: 349, 555; pl. 55, fig. 5 [as a separate species]; Keen, 1971: 244 [as a synonym of *S. ovalis*]; Hilde, 1980: 41.

**Description:** Ovale, equivalve, thin, approximately equilateral (1.5 × 1.5 to 1.8 × 50% from anterior end); anterior end rounded, posterior end acutely rounded, without a notch or gape. Pallial sinus large, much extended and posteriorly, meeting pallial line at an approximately 50° angle, producing a short extent of non-confluence. External sculpture of fine commarginal striae. Color pink to reddish, becoming white toward ventral margin, darker 50% both exteriorly and interiorly. Length to 34.2 mm. PRI 25921; Guánico, Panama.

## Type Material and Localities:

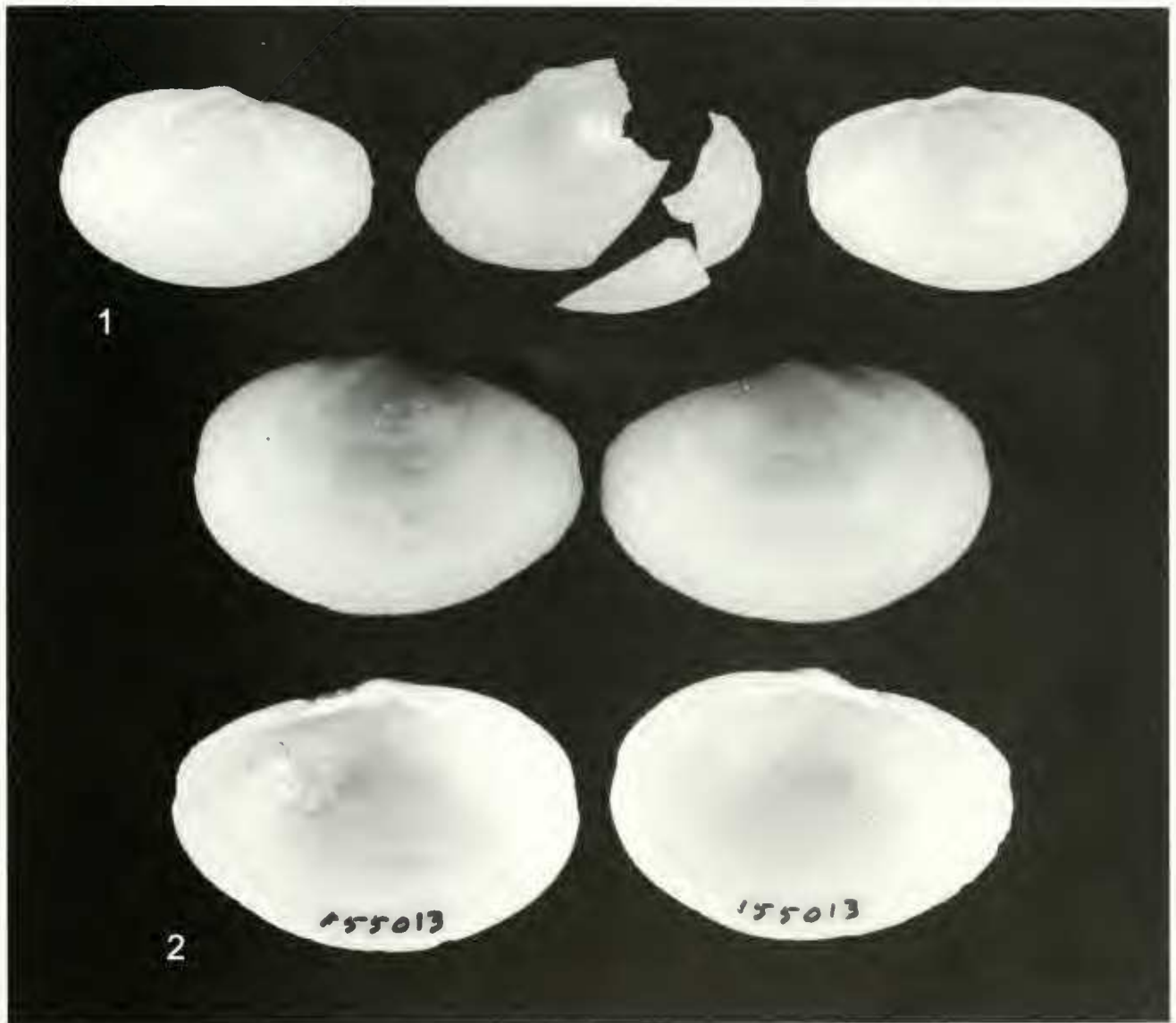
*Sanguinolaria ovalis*—BMNH 1957.7.15.1, holotype, with broken right valve; length, 22.2 mm; height, 14.0 mm; width (left valve), 3.1 mm (Fig. 1). "Central America", Hugh Cuning. **The locality is here clarified as being San Juan del Sur, Rivas Province, Nicaragua (11.3°N)**, following ICZN Code Recommendation 76A.1.4.

*Sanguinolaria vespertina*—ANSP 155013, holotype, pair; length, 31.1 mm; height, 20.9 mm; width, 11.3 mm (Fig. 2). ANSP 395873, paratype; length, 26.4 mm. SDNHM 50773, paratypes, 6 pairs, 2 valves. San Juan del Sur, Rivas Province, Nicaragua (11.3°N); H. N. Lowe, 1931. ANSP 154663, paratype, left valve; length, 29.7 mm. Corinto, Chiriquidega Province, Nicaragua (12.5°N); H. N. Lowe, 1931.

**Distribution:** Guaymas, Sonora, México (27.9°N) [CAS 154369], to Guánico, Los Santos Province, Panama (7.2°N) [PRI 25921]; from the intertidal zone to 37.5 m. Material examined: 20 lots.

Material from the Golfo de Panamá that has been misidentified as this species [USNM 962583, 96257, 96353, 96361, 96353], or labeled as *Sanguinolaria sp.* [Kaiser collection], while closely resembling a *Sanguinolaria*, has conspicuous lateral teeth, a low, elongate pallial sinus, and slightly oblique commarginal sculpture. This material is instead *Tellina (Hertellina) nicoyana* Hertlein and Strong, 1949 (pp. 55–56, 97, pl. 1, figs. 23–26) (see also: Olsson, 1961: 409).

**Discussion:** This species is very similar to its western Atlantic homologue, *S. sanguinolenta* (Gmelin, 1791: 3225—as *Solen*) [synonyms: *Solen fucatus* Spengler, 1791: 111; *Tellina ribicunda* Röding, 1795: 186; *Sanguinolaria rosea* Lamarek, 1801: 125; *Lobaria rosacea* Schumacher, 1817: 122–123, pl. 6; *Sanguinolaria nivea* Mörch, 1853: 10], which occurs from Florida and Texas, through the West Indies to Brazil. *Sanguinolaria ovalis* differs in being more rounded and less pointed posteriorly, in having a narrower hinge plate and finer hinge teeth, and in not attaining as large a size (*S. sanguinolenta* can attain at least 13.1 mm in length). Additionally, the pallial sinus of *S. sanguinolenta* meets the pallial line at a 90° angle, and it does not rise as far dorsally, without



**Figures 1, 2.** *Sanguinolaria ovalis* Reeve. 1. Holotype of *S. ovalis*, length 22.2 mm. 2. Holotype of *S. vespertina* Pilsbry and Lowe, length 31.1 mm.

as sharp an angle at its summit (Figure 10). This western Atlantic species may also develop thicker shells than any eastern Pacific material of *S. ovalis*. *Sanguinolaria rosea* Lamarek is not preoccupied by *Solen roseus* Gmelin, 1791 (p. 3227), which was based on a figure in Chemnitz (1782: pl. 7, fig. 55) that seems to be a *Soletellina*. This species was attributed to the Red Sea by Bertin (1850: 98). It is also not preoccupied by *Tellina rosea* Gmelin, 1791 (p. 3238), which is based on an illustration in Knorr (1771: pl. 9, fig. 3) that may be of a specimen of *Asaphis deflorata* (Linnaeus, 1758: 687, as *Venus*).

*Sanguinolaria vitrea* Deshayes, 1855 (p. 326), described from an unknown locality (see also Reeve, 1857: pl. 1, fig. 1), has been suggested to be an additional synonym of *S. sanguinolenta*, one based on light-colored

material (Cosel, 1989: 715). Cosel based this conclusion on two lots in the MNHN from Veracruz, Veracruz, Mexico. However, if material in the SBMNH (133229, 345687) and the CAS (152575) from near Veracruz is correctly identified as *S. vitrea*, this is a different species. Indeed, Dall (1898: 58) gave the distribution of *S. vitrea* as being from Texas to Colon, Panama, but this needs to be verified. The SBMNH and CAS material is white and translucent, with pallial sinuses that are not very dorsally extended and that meet the pallial line almost vertically (Figure 11); the largest specimen is 52.1 mm in length. The type lot of *S. vitrea* in the BMNH should be examined to be certain the species has been correctly interpreted.

*Sanguinolaria aureocincta* Martens, 1879 (p. 744)

[synonym: *S. africana* Cosel, 1959: 714–715; pl. 1, fig. K; pl. 7, figs. 26, 27], is a similar West African species. (A still earlier name that may apply to this species is *Tellina achatina* Spengler, 1798: 100.) In describing *S. africana*, Cosel (1959) differentiated it from *S. sanguinolenta* as being larger and more elongate, with less brightly colored beaks. These characters would also separate *S. aureotincta* from *S. ovalis*.

*Sanguinolaria tellinoides* A. Adams, 1850

Figures 3–6, 12

*Sanguinolaria tellinoides* A. Adams, 1850: 170, pl. 6, fig. 6; Reeve, 1857: pl. 1, fig. 3; Carpenter, 1857a: 286, 301; 1857b: 31; Mörel, 1860: 185; Carpenter, 1864: 563 [1872 reprint: 49]; Tryon, 1869: 75 [as "*S. tellinoides*"]; Bertin, 1880: 84; Dall, 1898: 58; Hertlein and Strong, 1950: 219–220; Keen, 1955: 185, 189, fig. 462; Olsson, 1961: 345, 550, pl. 77, figs. 10, 11; Keen, 1971: 244, 245, fig. 611

*Tellina miniata* Gould, 1851: 90; 1853: 397, pl. 16, fig. 1; Gould and Carpenter, 1857: 199; Carpenter, 1857a: 226, 231, 245, 301; 1857b: 547 [in Appendix as a senior synonym of *S. purpurca*]; Mörel, 1860: 185 [as "*minacea*" and a synonym of *S. tellinoides*]; Gould, 1862: 212; Carpenter, 1864: 537, 541, 543, 549, 563, 665 [1872 reprint: 23, 27, 29, 35, 49, 154]; Tryon, 1869: 78 [as a synonym of *S. tellinoides*]; Bertin, 1880: 84; Dall, 1898: 16 [as a synonym of *S. tellinoides*]; Hertlein and Strong, 1950: 219 [as a synonym of *S. tellinoides*]; Johnson, 1964: 110; Keen, 1971: 244 [as a synonym of *S. tellinoides*]

*Sanguinolaria purpurca* Deshayes, 1855: 346; Reeve, 1857: pl. 1, fig. 5; Gould and Carpenter, 1857: 199 [as a synonym of *S. miniata*]; Carpenter, 1857a: 226, 231, 245, 301, 352; 1857c: 31, 548; 1864: 563 [1872 reprint: 49]; Tryon, 1869: 75 [as a synonym of *S. tellinoides*]; Dall, 1898: 61 [as a synonym of *S. tellinoides*]; Hertlein and Strong, 1950: 219, 251, pl. 2, figs. 5, 8 [as a separate species]; Keen, 1955: 185, 189, fig. 461; Keen, 1971: 244 [as a synonym of *S. tellinoides*]

*Sanguinolaria tellinoides elongata* Mörel, 1860: 185; Hertlein and Strong, 1950: 220 [not preoccupied by *Gari (Psammotacna elongata)* Lamarck, 1815: 511—as *Psammobia*], which is widespread in the Indo-Pacific (Willan, 1993: 61–64)

**Description:** Ovate-elongate, equivalve, somewhat thicker-shelled than *S. ovalis* at a similar size, becoming sturdier in large specimens; posterior end somewhat longer (about 1/2 from anterior end); anterior end rounded, rounded and somewhat produced, set off by a distinct radial sulcus approximately two-thirds distance from end; beaks most evident in large specimens (1.5–2.5 mm), rounded and pointed dorsally, meeting pallial sinus, with its ventral margin this completely outlined (0.5–1.0 mm) (Figure 12). Sculpture of line ornamentation: Cteniform muscle scars inflated in large specimens; color pink to purple, sometimes with faint dorsal marginal color bands; interior often dull purple. Length to 71.5 mm (ANSP 19529, Yucatán, Quintana Roo, Mexico).

**Type Material and Localities:**

*Sanguinolaria tellinoides*—BMNH 1966540/1, pair, **lectotype here designated**; length, 32.6 mm; height, 19.2 mm; width, 8.4 mm (Figure 3). BMNH1966540/2, paralectotype; length, 32.5 mm. Gulf of California. **The locality is here clarified as being Guaymas, Sonora, Mexico (27.9°N)**, following ICZN Code Recommendation 76A.1.4.

*Tellina miniata*—MCZ 169255, holotype, pair; length, 51.0 mm; height, 33.0 mm; width, 14.3 mm (Figure 4). San Juan [del Sur, Rivas Province, Nicaragua] (11.3°N); Lieut. T. P. Green. The locality was mistakenly given by Johnson (1964: 110) as being in Orange County, California.

*Sanguinolaria purpurca*—BMNH 1966539/1, **lectotype here designated**, pair; length, 50.0 mm; height, 31.7 mm; width, 15.1 mm (Figure 5). BMNH 1966539/2, 3, paralectotypes, pairs, lengths, 48.4 mm, 44.4 mm. The original specimens came from the collection of Hugh Cuming, but the type locality was given as unknown and is **here clarified as being Guaymas, Sonora, Mexico (27.9°N)**, following ICZN Code Recommendation 76A.1.4.

*Sanguinolaria tellinoides elongata*—ZMC unnumbered, holotype, pair; length, 52.4 mm; height, 30.2 mm; width, 13.3 mm (Figure 6). "Realejo" [Corinto, Chinendega Province, Nicaragua] (12.5°N); A. S. Oersted, 1846–1848.

**Distribution:** Punta Pescadero, Pacific coast of Baja California Sur (23.3°N) [USNM 22964], into the Golfo de California as far north as Punta Diggs, Baja California (30.9°N) [CAS 150381], and Puerto Libertad, Sonora (29.9°N) [ANSP 184183], Mexico, to Cojimies, Esmeraldas Province, Ecuador (0.4°N) [PRI 25920B]; intertidal zone to 14 m. Material examined: 79 lots. *Sanguinolaria tellinoides* has been reported from the Pliocene Jama Formation at Puerto Jama, Manabí Province, Ecuador (0.2°S) (Pilsbry and Olsson, 1941: 72), and (as "aff.") from the late Miocene Gatun Formation on the Atlantic coast of Panama west of Colón (Woodring, 1982: 673, pl. 115, fig. 12).

**Discussion:** The pallial sinuses of this species become more dorsally pointed in large specimens. This species can be distinguished from *Psammotella bertini* in being equivalve, and by its more rounded outline, less attenuate posterior end, and more dorsally extended and pointed pallial sinus.

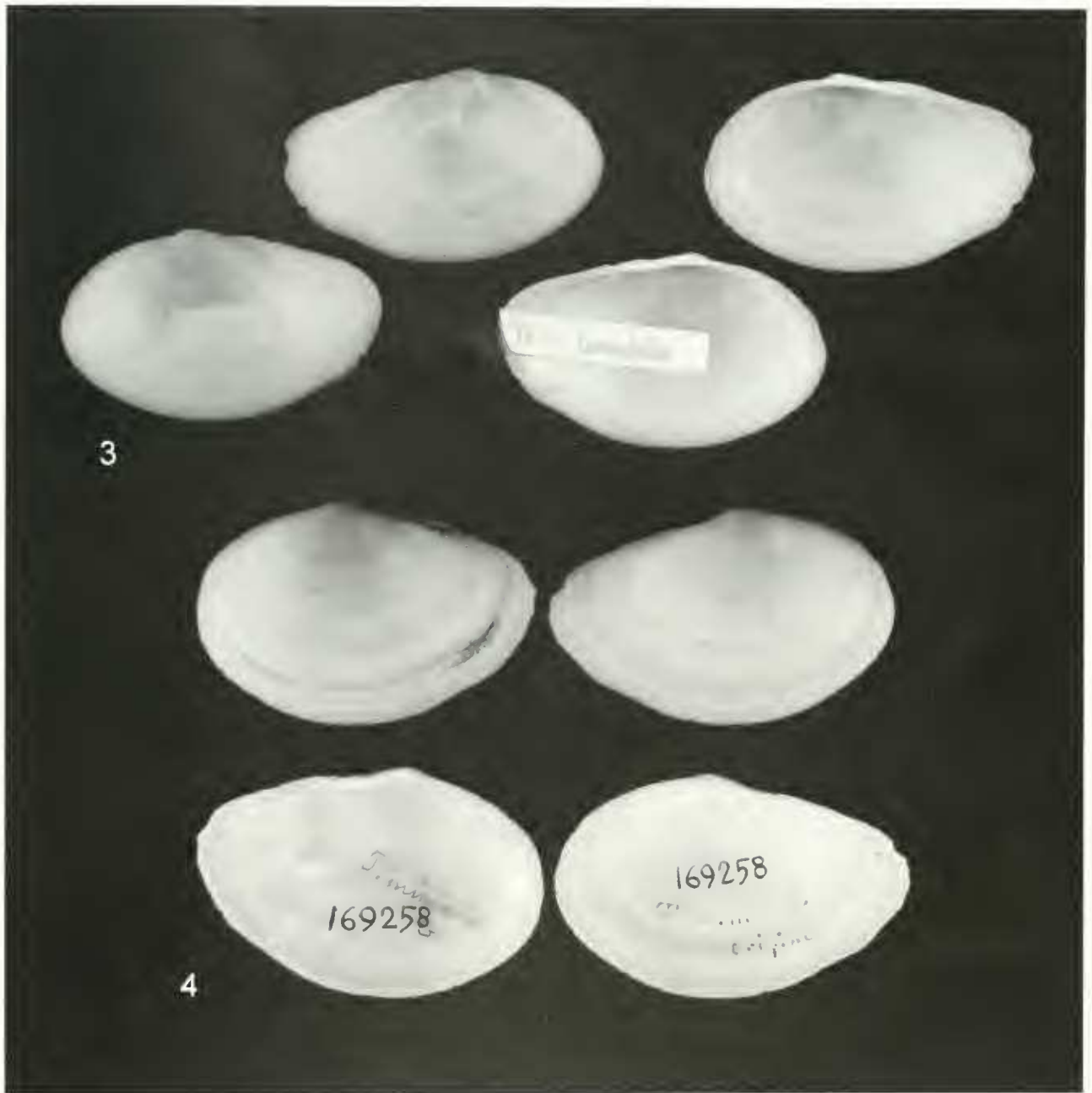
*Sanguinolaria tenuis* Olsson, 1961

Figure 7, 13

*Sanguinolaria tenuis* Olsson, 1961: 349, 558, pl. 55, fig. 6; Keen, 1971: 244 [as a synonym of *S. ovalis*; not a homonym with *Psammobia tenuis* Deshayes, 1855: 320, a synonym of the Indo-Pacific *Gari anomala* (Deshayes, 1855: 320—as *Psammobia*) (Willan, 1993: 22), nor with *Soletellina tenuis* (Deshayes, 1855: 349—as *Capsa (Capsella)*] from the Philippine Islands (Willan, 1993: 77)]

**Description:** Ovate-elongate, equivalve; anterior end somewhat longer (beaks at 41% from anterior end); anterior end rounded; posterior end rounded, with a slight trace of a radial sulcus at two-thirds of way to posterior end. Pallial sinus large, extended dorsally, meeting pallial at an approximate 75° angle (Figure 13). Sculpture of





Figures 3, 4. *Sanguinolaria tellinoides* A. Adams. 3. Lectotype of *S. tellinoides*, length 32.6 mm. 4. Holotype of *Tellina miniata* Gould; length, 51.0 mm.

fine commarginal striae. Exterior color white, with a light pink radial band a little anterior of midline; white interiorly. Length to 33.5 mm (holotype).

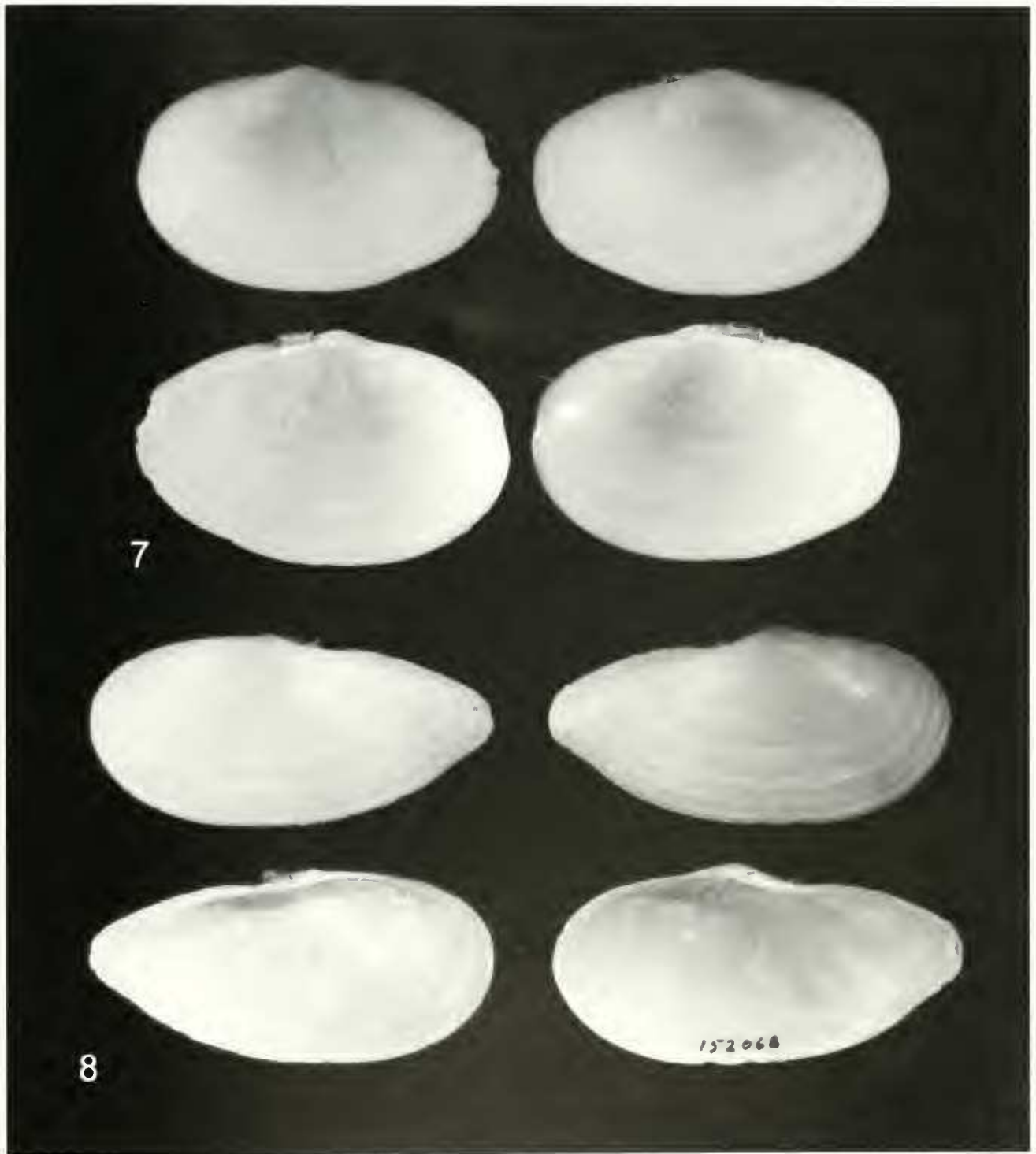
**Type Material and Locality:** ANSP 218911, holotype, pair; length, 33.5 mm; height, 26.1 mm; width, 10.9 mm (Figure 7); Curoa, Manabí Province, Ecuador (0.5°N); A. A. Olsson, 1958. An additional fragmentary specimen cited by Olsson (1961) from Punta Montañita, Guayas Province, Ecuador (1.5°S), would be a paratype;

it has not been located in the UMML. Unfortunately, none of Olsson's specimens of *Sanguinolaria* have yet been located in the UMML. N. Voss, e-mail, 2–3 May 2001).

**Distribution:** Thus far known only from the original specimens—Curoa, Manabí Province (0.5°N) (holotype), presumably to Punta Montañita, Guayas Province (1.5°S) (specimen missing), Ecuador. Both specimens were collected in beachdrift.



Figure 5-6. *S. purpurea* Adams. 5. Lectotype of *S. purpurea* Deshayes, length 50.0 mm. 6. Holotype of *S. purpurea* Adams, length 42.0 mm.



Figures 7, 8. 7. *Sauginolaria tennis* Olsson: holotype, length, 33.5 mm. 8. *Psammotella bertini* Pilsbry and Lowe: neotype of *Tellina hauleyi* Bertini; length, 67.5 mm.

**Discussion:** This is the rare South American ally of *S. ovalis*. It differs in not having rose-colored beaks, in being thicker shelled, and in having a more rounded posterior end.

Genus *Psammotella* Herrmannsen, 1852

*Psammotella* Herrmannsen, 1852: 114, ex "Psammotelle" Blainville, 1828: 541 [vernacular].

Type species (by monotypy): "*T. rufescens* Chemm.", = *Tellina rufescens* Dillwyn, 1817: 85, ex Chemnitz ms. = *Tellina eruenta* [Lightfoot], 1768: 10 [as *Tellina "eruenta"*], 58 [as *T. eruenta*]; first reviser: Rehder, 1967: 7. Recent, western Atlantic, [*non Psammotella* H. Adams and A. Adams, 1856: 393, ex Deshayes ms. = *Psammotellina* P.-H. Fischer, 1857: 1105, new name, a subgenus of *Gari* and perhaps a senior synonym of *Psammotacna* Dall, 1900: 976 [Willan, 1993: 60]].

**Description:** Shell inequivalve; right valve more inflated; posterior gape narrow. Pallial sinus deep, moderately elevated dorsally, without an expanded muscle attachment anterior to posterior adductor muscle scar. Posterior cruciform muscle scar with a small anterior satellite scar. Hinge moderately heavy; teeth small; nymph weak.

**Discussion:** I here rank this New World taxon as a genus because of its major differences from *Sanguinolaria*—conspicuous differences between left and right valves, plus differences in its pallial sinus and cruciform muscle scars.

*Psammotella bertini* (Pilsbry and Lowe, 1932)  
Figures 5, 14

*Tellina hanleyi* Bertin, 1875: 268–269 [*non Tellina hanleyi* Dmiker, 1853: 53–54, pl. 10, figs. 4–6].

*Sanguinolaria bertini* Pilsbry and Lowe, 1932, new name for *Tellina hanleyi* Bertin, 1880, *non* Dmiker, 1853; Pilsbry and Lowe, 1932: 91, 143, pl. 10, figs. 7, 8; Hertlein and Strong, 1950: 220–221; Keen, 1958: 188, 189, fig. 459; Olsson, 1961: 349, 550, pl. 77, fig. 8; Keen, 1971: 244, 245, fig. 112; Hertz, 1986: 36.

*Tellina rufescens* "Chemnitz", *autt.*, *non T. rufescens* Dillwyn, 1817: 85, ex Chemnitz ms. Hanley, 1846: 307–308, 332, pl. 14, fig. 11. Capriater, 1857b: 32; Römer, 1872: 111–112, 113–114, pl. 1, fig. 1. *non Tellina rufescens* Dillwyn, 1817: 85; Chemnitz.

**Description:** Shell inequivalve; right valve conspicuously more inflated; posterior end longer (beaks at 40–45°); hinge moderately heavy; posterior end rounded; posterior end muscle scar covered by a radial sulcus near end

in right valve, tip truncate; posterior end sinuous in right valve, tip subtruncate. Pallial sinus deep, its dorsal margin in right valve elevated, rounded to bluntly angular; ventral margin of sinus meeting pallial line at an approximate 30° angle, confluent with pallial line for approximately 75% of its length (Figure 14). Sculpture of fine, irregular commarginal striae, strongest on posterior slope; right valve with radial striae, strongest along ventral margin and in large specimens. Cruciform muscle scars bulbous in large specimens. Color pink to purple, sometimes with darker commarginal bands. Length to 92.8 mm (LACM 71-179.12, Punta Pequeña, Baja California Sur, Mexico).

**Type Material and Locality:** *Tellina hanleyi* Bertin was based on the figure of *Tellina rufescens* "Chemnitz" in Hanley (1846; see above), which presumably came from the only locality mentioned—Tumbes, Tumbes Province, Peru (3.5°S). This specimen has not been located in the BMNH (J. Pickering, e-mail, 7 June 2001), nor in the Leeds Museum, present location of a substantial amount Hanley's material (A. Norris, e-mail, 13 June 2001). The specimen selected by Pilsbry and Lowe (1932) as "holotype" of their new name—ANSP 152068 from Acapulco, Guerrero, Mexico (16.9°N) (Figure 5)—would normally have no type status, because the type of a renamed junior homonym remains the original type of that taxon (ICZN Code Art. 72.7). However, because (1) *Tellina rufescens* was long used to refer both to the western Atlantic species now known as *Psammotella eruenta* and to the eastern Pacific *P. bertini*, (2) we cannot ascertain which of these two species Hanley actually illustrated, (3) there is no good material of the eastern Pacific species in collections from Tumbes, Peru, and (4) Pilsbry and Lowe's "type" is a fine specimen long accorded type status, **this specimen is here designated neotype** of *Tellina hanleyi* Bertin. It is a pair of valves measuring 67.5 mm in length, 28.1 mm in height, and 12.4 mm in width.

**Distribution:** Laguna Ojo de Liebre [Scammon's Lagoon], Baja California Sur (27.5°N) [ANSP 225928], La Paz, Baja California Sur (24.2°N) [SBMNH 24586, 24587], and Empalme, Sonora (27.9°N) [SBMNH 135133], Mexico, to Máncora, Tumbes Province, Peru (4.1°S) [CAS 154370; SBMNH 125767], and evidently as far south as Colán, Piura Province, Peru (5.0°S) (Paredes and Cardozo ms.; Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Peru); intertidal zone to 17 m. Material examined: 98 lots.

**Figures 9–15.** Dorsal views of shells of *Sanguinolaria* and *Psammotella* showing hinge, pallial sinus, and adductor scars of left and right valves. **9.** *S. ovalis* (Gmelin); CAS 152067; Acapulco, Guerrero, Mexico; length, 26.2 mm. **10.** *S. sanguinolenta* (Gmelin); CAS 152069; Acapulco, Guerrero, Mexico; length, 16.1 mm. **11.** *S. vitrea* Deshayes; CAS 152576; Boca del Río, Veracruz, Veracruz, Mexico; length, 44.5 mm. **12.** *S. tenuis* Olsson; holotype; CAS 152070; Acapulco, Guerrero, Mexico; length, 66.6 mm. **13.** *S. ovalis* (Gmelin); CAS 152066; Acapulco, Guerrero, Mexico; length, 44.5 mm. **14.** *Psammotella bertini* (Pilsbry and Lowe); CAS 150375; Acapulco, Guerrero, Mexico; length, 26.2 mm. **15.** *P. eruenta* (Dillwyn); holotype; CAS 150350; Acapulco, Guerrero, Mexico; length, 66.6 mm. **16.** *P. bertini* (Pilsbry and Lowe); CAS 150351; Colón, Panama Province, Panama; length, 61.6 mm.





**Discussion:** *Psammotella bertini* is very similar to its western Atlantic homologue, *P. cruenta* (Lightfoot, 1756: see under genus) [synonyms: *Tellina operculata* Gmelin, 1791: 3235 (as "*T. operculata*" in Lugduni printing; *Tellina rufescens* Dillwyn, 1817: 85, ex Chemnitz ms). The last synonym is *non T. rufescens* Gmelin, 1791: 3235, which was based on Gualtieri (1742: pl. 25, fig. C), seemingly a *Venerupis*, perhaps best regarded as one of the many synonyms of *V. decussatus* (Linnaeus, 1758: 690—as *Venus*), as suggested by Carpenter (1857b: 32). *Psammotella cruenta* occurs throughout the Caribbean to Brazil. *Psammotella cruenta* differs from *P. bertini* in being more inequilateral, with a flatter left valve and a more inflated right valve, and a less dorsally expanded pallial sinuses in both valves (Figure 15). Other supposed differences that have been suggested vary too much among populations to be useful. For example, Hertlein and Strong (1950) thought that *P. cruenta* is narrower posteriorly, but this does not seem to be the case if enough lots are studied. They also said that the pallial sinuses of *P. cruenta* were "more arched posteriorly" ("extending further posteriorly") and "confluent with the pallial line for a greater distance," but I can't see much difference in these parameters.

*Psammotella smithwoodwardi* (Maury, 1917: 393–394 [= 229–230], pl. 64 [= 35], figs. 1, 2—as *Sanguinolaria* (*Psammotella*)), from the late Miocene Cercado Formation of the Dominican Republic is presumably ancestral to these two species. Maury pointed out its affinity to *P. bertini*, but did not compare them. The original figures are insufficiently clear to see any differences from either Recent species. Weisbord (1964: 372) noted that this Miocene species differs from Recent material in lacking radial striae in the right valve.

*Psammotella alouata* Olsson (1922: 432–433 [= 260–261], pl. 32 [= 29], figs. 5, 6—as *Sanguinolaria* (*Samotella*) [sic] from the late Miocene Gatun Formation at Banana Hill on the Atlantic coast of Costa Rica, was based on two poorly preserved valves. The species was said to be more elongate posteriorly than *P. cruenta* and to lack radial striae in the right valve. Weisbord (1964: 372–373) added that the anterodorsal margin of the right valve and the posterodorsal margin of the left valve were more concave than in *P. cruenta*. Both of these fossil species are thus far too poorly known to draw any useful conclusions.

For a comparison with *Sanguinolaria tellinoides*, see [Figure 16](#) (two species).

#### FIGURE 16. IDIAXA

*Psammotella nuttallii* (Conrad, 1837: p. 231, pl. 17, fig. 6) (*Psammotella nuttallii* nom. null.), is a synonym of *Psammotella bertini* (Linnaeus, 1758: 677—as *Tellina*)

*S. pacifica* (Conrad, 1837: 241, pl. 18, fig. 13) is now regarded as a synonym of *S. nuttallii* (Conrad, 1837: 230–231; pl. 17, fig. 6). *S. pacifica* (Conrad, 1837: 241, pl. 18, fig. 13) (*Psammotellina pacifica*) is a combination

of some authors, is a synonym of *Macoma balthica* (Linnaeus, 1758) (Coan et al., 2000: 417).

*S. grandis* Carpenter, 1857, ex Gould ms, a *nomen nudum* in Carpenter (1857a: 225, 349), is regarded as a probable synonym of *Nuttallia nuttallii* Conrad, 1837 (Coan et al., 2000: 426).

*S. nuttallii* Conrad, 1837 (pp. 230–231; pl. 17, fig. 6) is now placed as *Nuttallia nuttallii* (Conrad, 1837) (Coan et al., 2000: 426).

*S. pacifica* (Conrad, 1837: 241, pl. 18, fig. 13—as *Psammotellina*) is a combination by some authors for the species now known as *Heterodonax pacificus* (Conrad, 1837) (Coan et al., 2000: 425).

*S. rubroradiata* Carpenter, 1860 (p. 1), ex Nuttall or Conrad ms, is a *nomen nudum* now regarded as a probable synonym of *Gari californica* (Conrad, 1849: 121) (Coan et al., 2000: 426; Coan, 2000: 3).

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